

Docket No.: 151-P-08970US02

John E. Kast et al

Serial No.: 10/772,944

Examiner: Oropeza, Frances P

AFFIDAVIT UNDER 37 C.F.R. §1.132

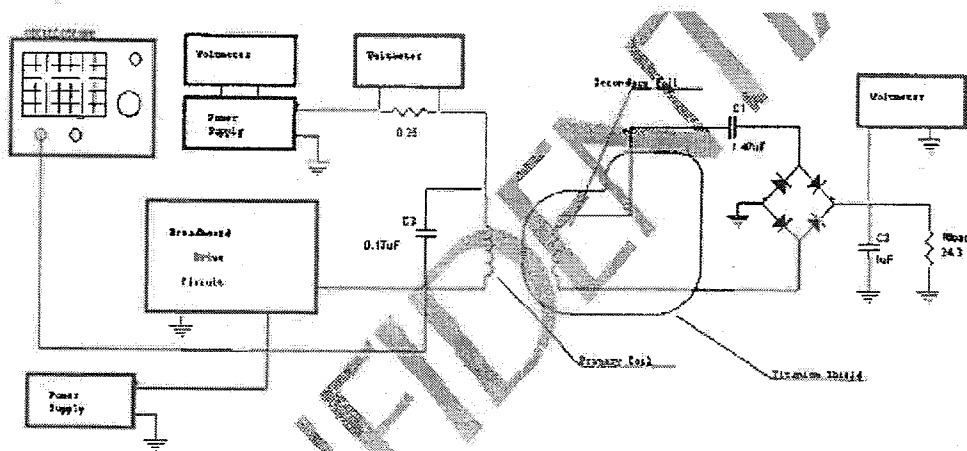
John E. Kast, being first duly sworn, does hereby depose and say as follows:

1. That I am the same John E. Kast who is identified as a co-inventor in the above-
 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990 1000 1010 1020 1030 1040 1050 1060 1070 1080 1090 1100 1110 1120 1130 1140 1150 1160 1170 1180 1190 1200 1210 1220 1230 1240 1250 1260 1270 1280 1290 1300 1310 1320 1330 1340 1350 1360 1370 1380 1390 1400 1410 1420 1430 1440 1450 1460 1470 1480 1490 1500 1510 1520 1530 1540 1550 1560 1570 1580 1590 1600 1610 1620 1630 1640 1650 1660 1670 1680 1690 1700 1710 1720 1730 1740 1750 1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300 2310 2320 2330 2340 2350 2360 2370 2380 2390 2400 2410 2420 2430 2440 2450 2460 2470 2480 2490 2500 2510 2520 2530 2540 2550 2560 2570 2580 2590 2600 2610 2620 2630 2640 2650 2660 2670 2680 2690 2700 2710 2720 2730 2740 2750 2760 2770 2780 2790 2800 2810 2820 2830 2840 2850 2860 2870 2880 2890 2900 2910 2920 2930 2940 2950 2960 2970 2980 2990 3000 3010 3020 3030 3040 3050 3060 3070 3080 3090 3100 3110 3120 3130 3140 3150 3160 3170 3180 3190 3200 3210 3220 3230 3240 3250 3260 3270 3280 3290 3300 3310 3320 3330 3340 3350 3360 3370 3380 3390 3400 3410 3420 3430 3440 3450 3460 3470 3480 3490 3500 3510 3520 3530 3540 3550 3560 3570 3580 3590 3600 3610 3620 3630 3640 3650 3660 3670 3680 3690 3700 3710 3720 3730 3740 3750 3760 3770 3780 3790 3800 3810 3820 3830 3840 3850 3860 3870 3880 3890 3900 3910 3920 3930 3940 3950 3960 3970 3980 3990 4000 4010 4020 4030 4040 4050 4060 4070 4080 4090 4100 4110 4120 4130 4140 4150 4160 4170 4180 4190 4200 4210 4220 4230 4240 4250 4260 4270 4280 4290 4300 4310 4320 4330 4340 4350 4360 4370 4380 4390 4400 4410 4420 4430 4440 4450 4460 4470 4480 4490 4500 4510 4520 4530 4540 4550 4560 4570 4580 4590 4600 4610 4620 4630 4640 4650 4660 4670 4680 4690 4700 4710 4720 4730 4740 4750 4760 4770 4780 4790 4800 4810 4820 4830 4840 4850 4860 4870 4880 4890 4900 4910 4920 4930 4940 4950 4960 4970 4980 4990 5000 5010 5020 5030 5040 5050 5060 5070 5080 5090 5100 5110 5120 5130 5140 5150 5160 5170 5180 5190 5200 5210 5220 5230 5240 5250 5260 5270 5280 5290 5300 5310 5320 5330 5340 5350 5360 5370 5380 5390 5400 5410 5420 5430 5440 5450 5460 5470 5480 5490 5500 5510 5520 5530 5540 5550 5560 5570 5580 5590 5600 5610 5620 5630 5640 5650 5660 5670 5680 5690 5700 5710 5720 5730 5740 5750 5760 5770 5780 5790 5800 5810 5820 5830 5840 5850 5860 5870 5880 5890 5900 5910 5920 5930 5940 5950 5960 5970 5980 5990 6000 6010 6020 6030 6040 6050 6060 6070 6080 6090 6100 6110 6120 6130 6140 6150 6160 6170 6180 6190 6200 6210 6220 6230 6240 6250 6260 6270 6280 6290 6300 6310 6320 6330 6340 6350 6360 6370 6380 6390 6400 6410 6420 6430 6440 6450 6460 6470 6480 6490 6500 6510 6520 6530 6540 6550 6560 6570 6580 6590 6600 6610 6620 6630 6640 6650 6660 6670 6680 6690 6700 6710 6720 6730 6740 6750 6760 6770 6780 6790 6800 6810 6820 6830 6840 6850 6860 6870 6880 6890 6900 6910 6920 6930 6940 6950 6960 6970 6980 6990 7000 7010 7020 7030 7040 7050 7060 7070 7080 7090 7100 7110 7120 7130 7140 7150 7160 7170 7180 7190 7200 7210 7220 7230 7240 7250 7260 7270 7280 7290 7300 7310 7320 7330 7340 7350 7360 7370 7380 7390 7400 7410 7420 7430 7440 7450 7460 7470 7480 7490 7500 7510 7520 7530 7540 7550 7560 7570 7580 7590 7600 7610 7620 7630 7640 7650 7660 7670 7680 7690 7700 7710 7720 7730 7740 7750 7760 7770 7780 7790 7800 7810 7820 7830 7840 7850 7860 7870 7880 7890 7900 7910 7920 7930 7940 7950 7960 7970 7980 7990 8000 8010 8020 8030 8040 8050 8060 8070 8080 8090 8100 8110 8120 8130 8140 8150 8160 8170 8180 8190 8200 8210 8220 8230 8240 8250 8260 8270 8280 8290 8300 8310 8320 8330 8340 83

2. That I received a Bachelor of Science degree in Mechanical Engineering from the University of Minnesota in 1983.

3. That I began working in the Cardiac Rhythm Management division of Medtronic, 1984. I joined the Neuromodulation division within Medtronic in 1999 and have worked since that time on implantable Neuromodulation products. I am currently a Senior Thermal Systems Technology Engineer.

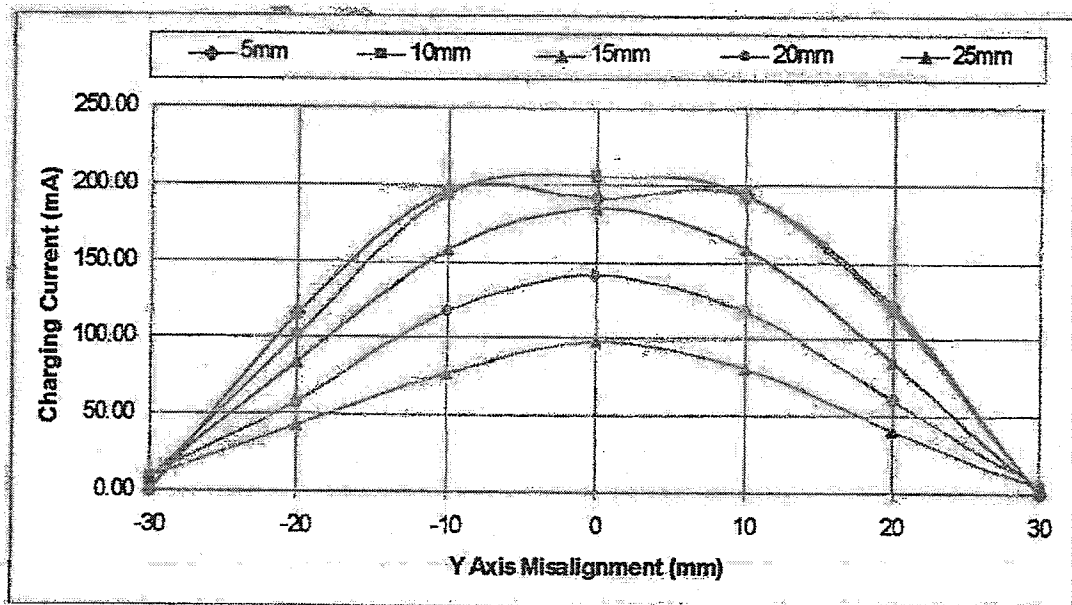
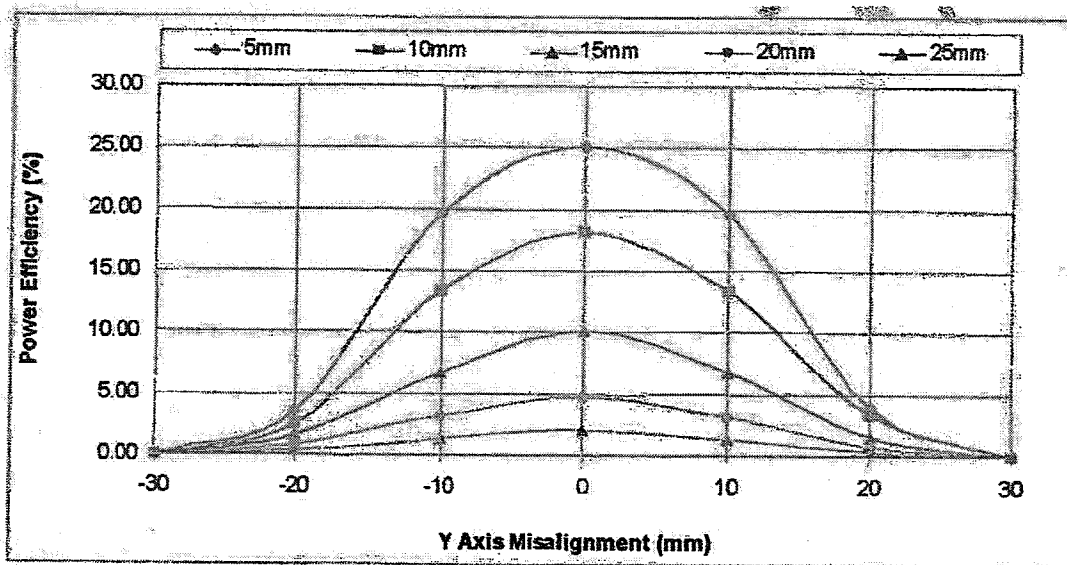
5. I had a vendor test the implantable medical device in an engineering lab with a test system to simulate the implantation of the implantable medical device in a human. The test system is as follows, in which the power supply was set to 24 Volts:



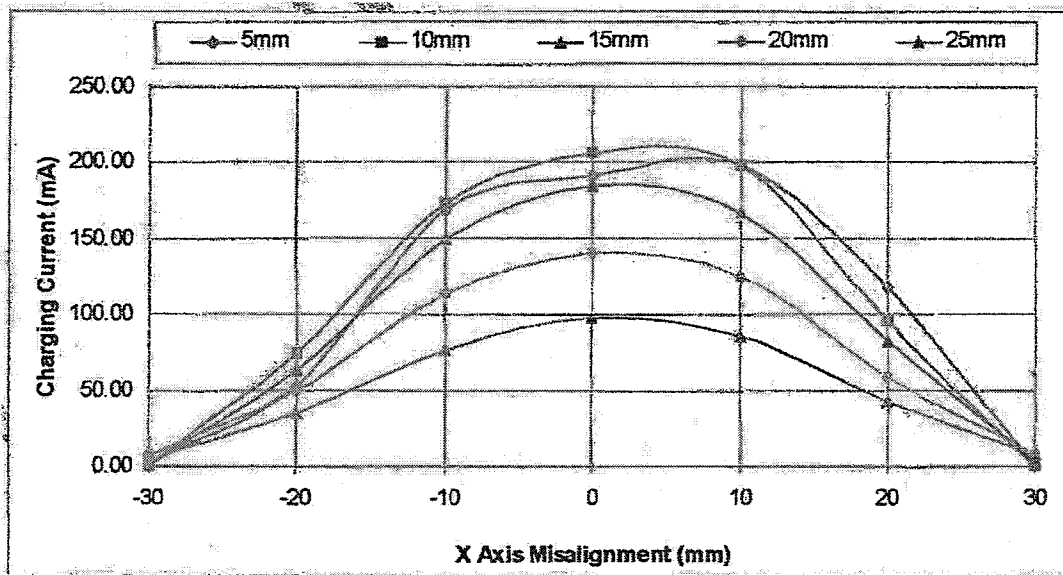
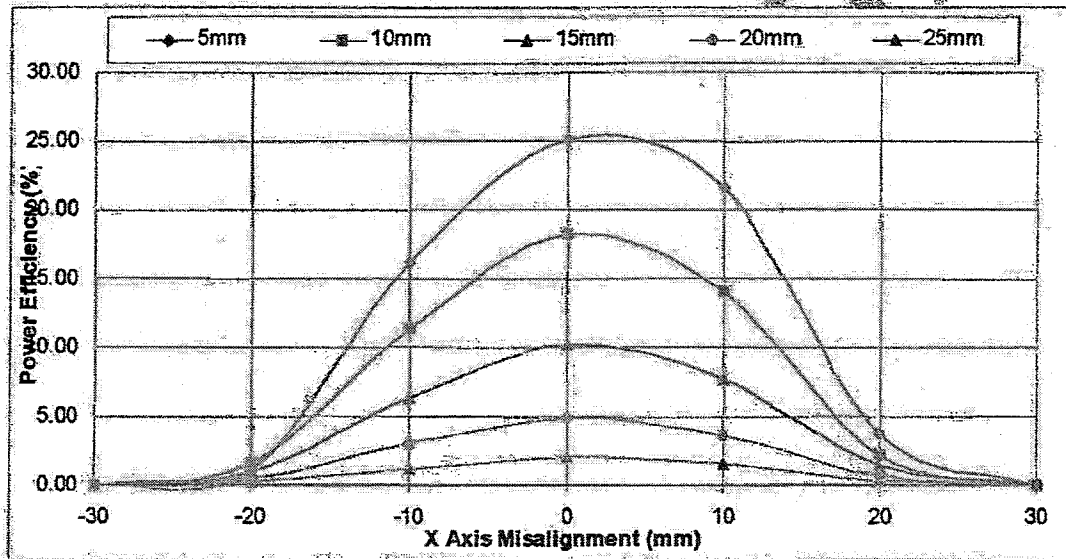
6. The external primary recharging coil was used to simulate recharging of the implantable medical device in a human. A variety of different secondary recharging coils were utilized, but the primary recharging coil was not varied. The location of the external primary recharging coil relative to the secondary recharging coil was changed to different positions for each secondary coil.

7. The power efficiency and charging current for each secondary coil and for each amount of axial misalignment is presented in the following graphs. The line and symbol of each graph relate to the z-axis separation of the primary recharging coil from the secondary recharging coil.

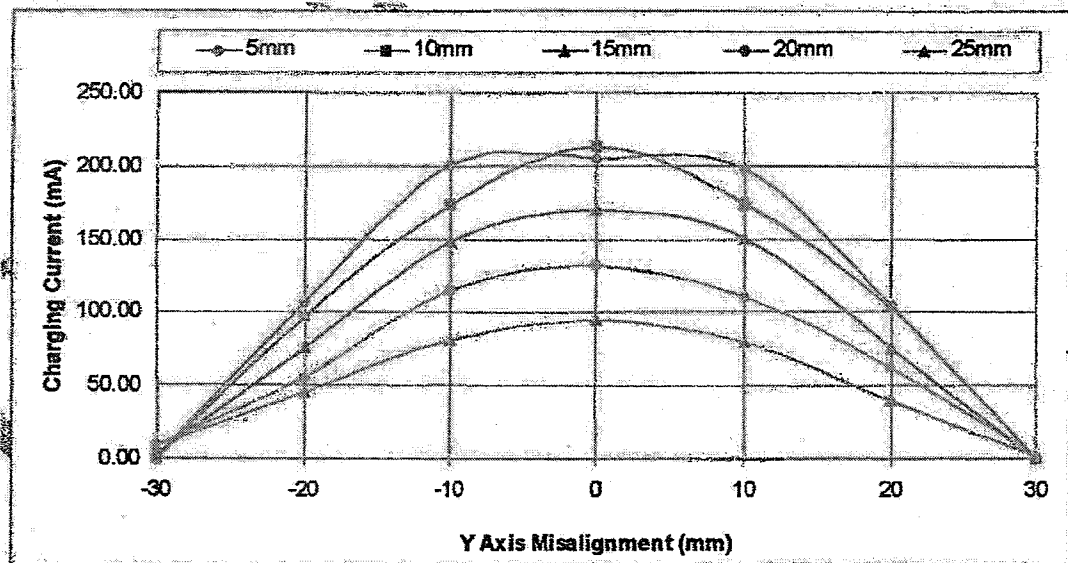
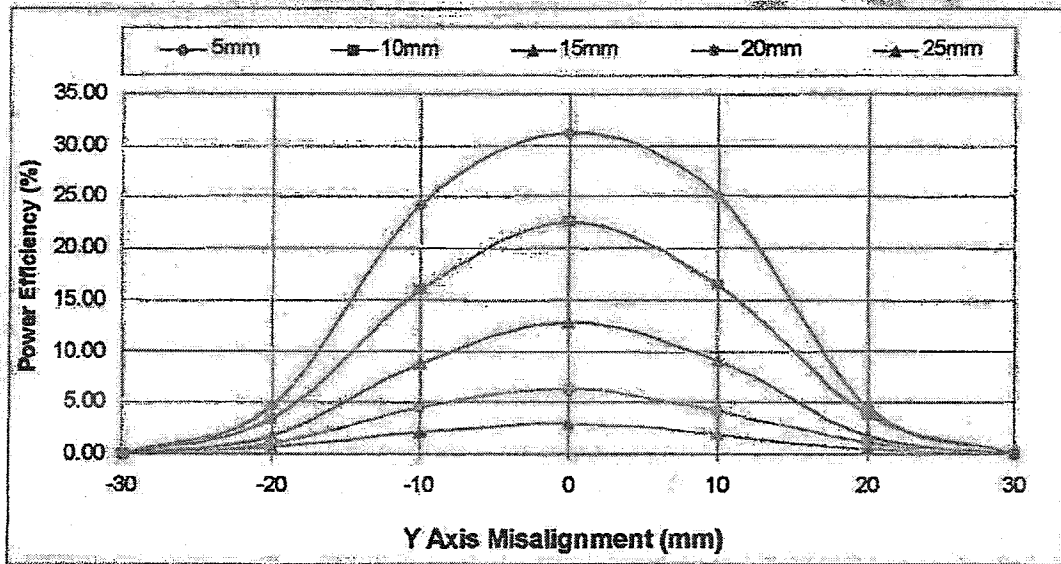
Y Axis Misalignment, Secondary Recharging Coil A



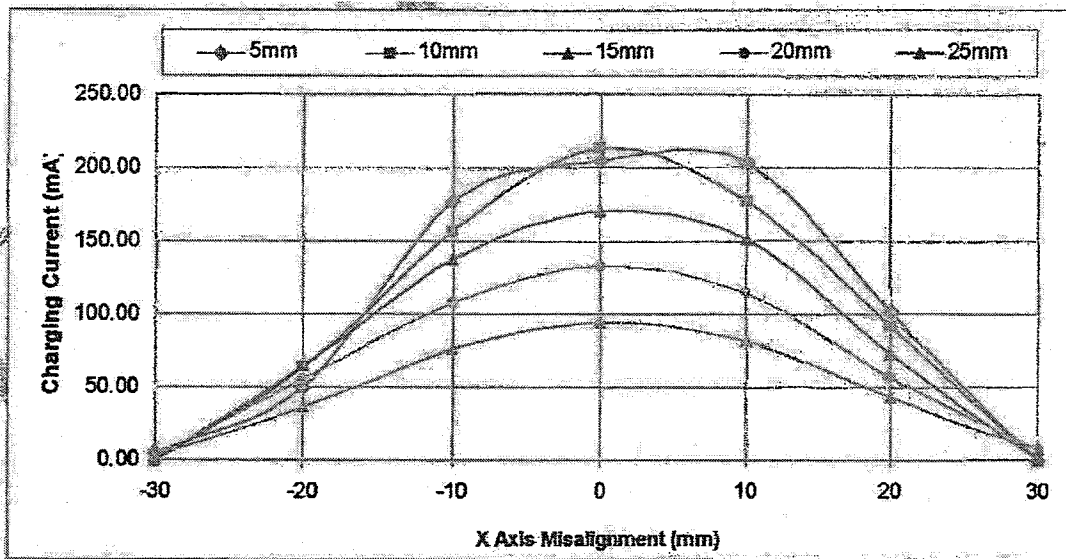
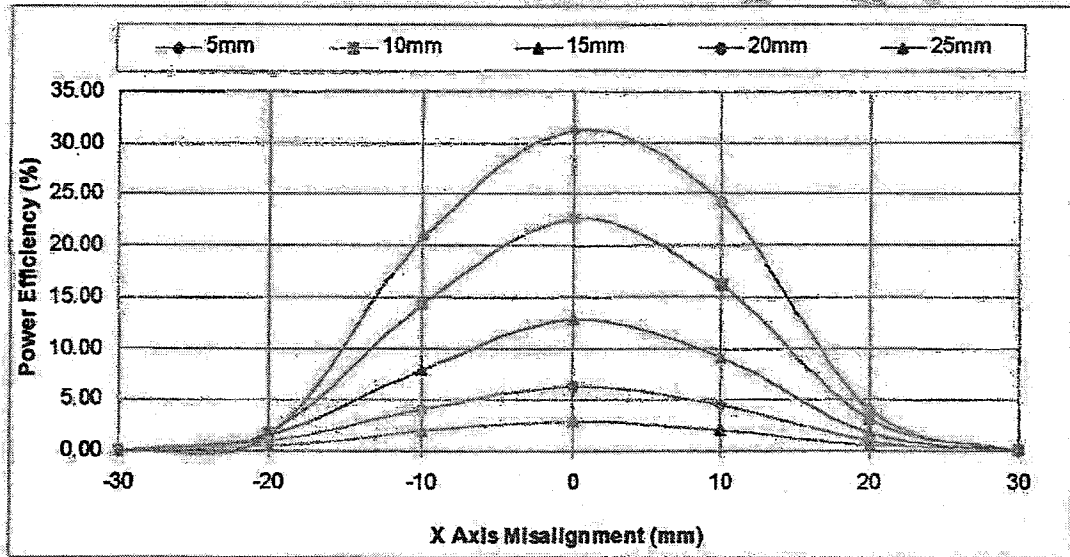
X Axis Misalignment, Secondary Recharging Coil A



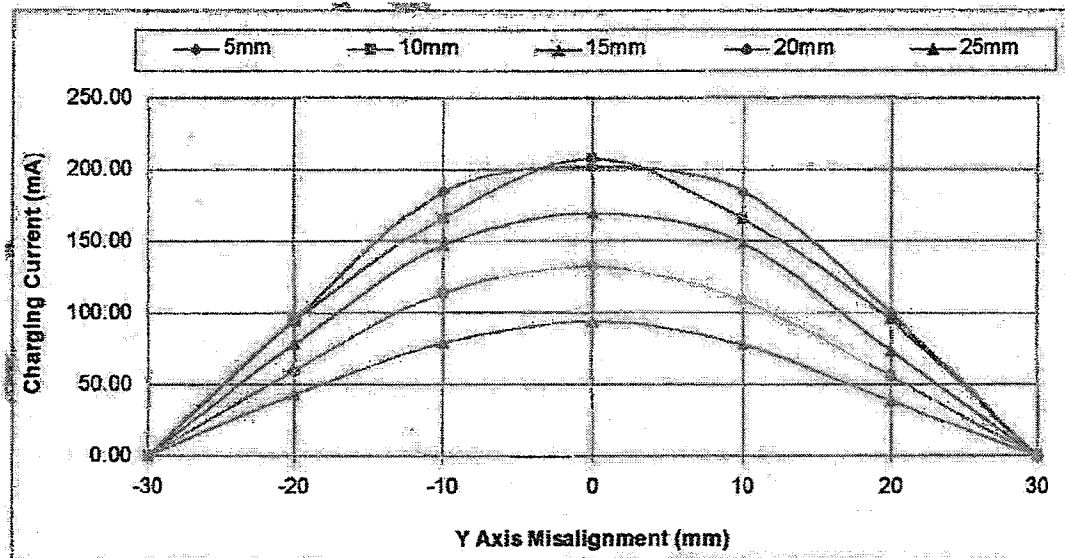
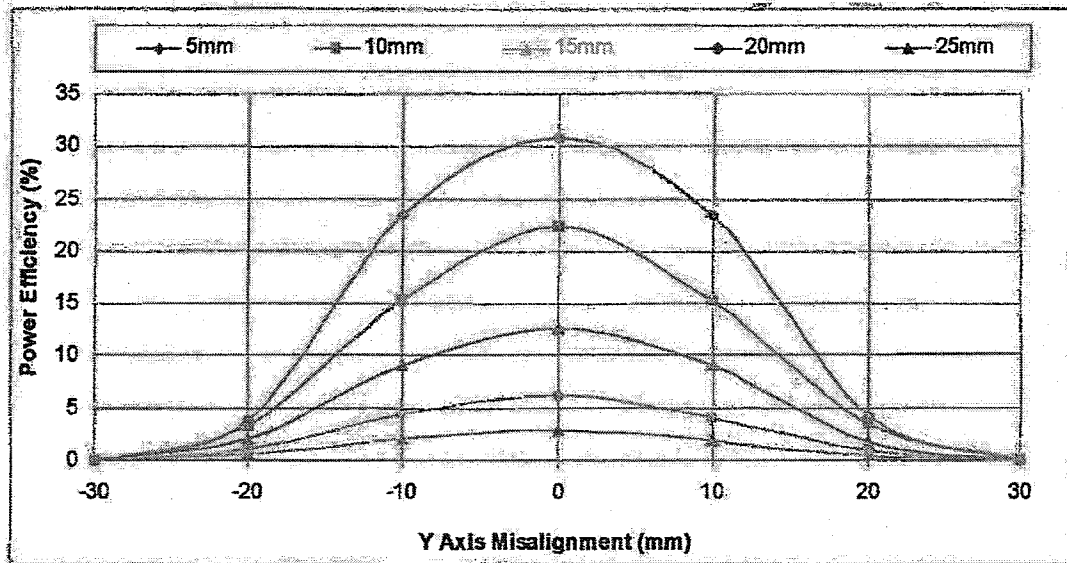
Y Axis Misalignment, Secondary Recharging Coil B



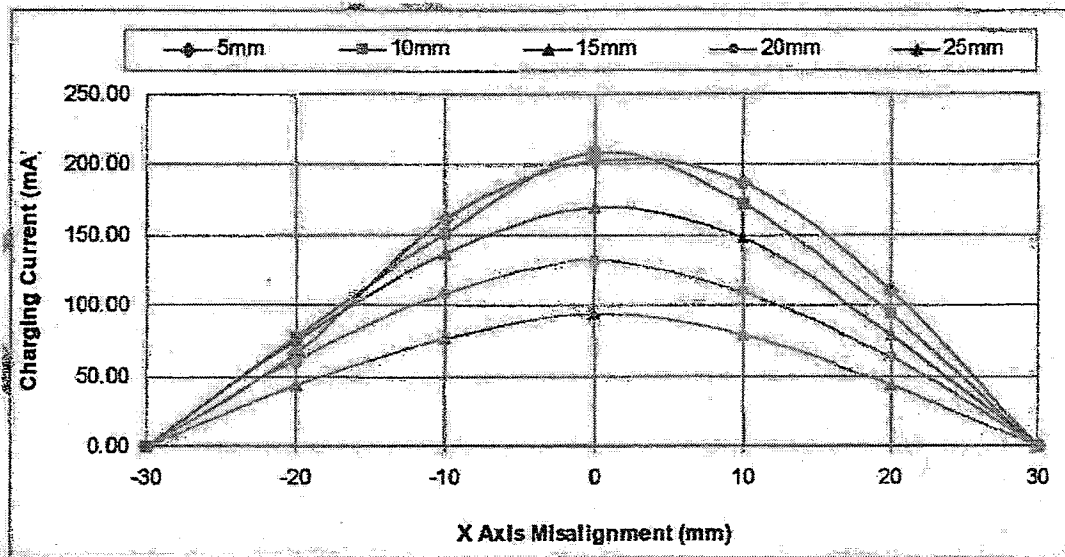
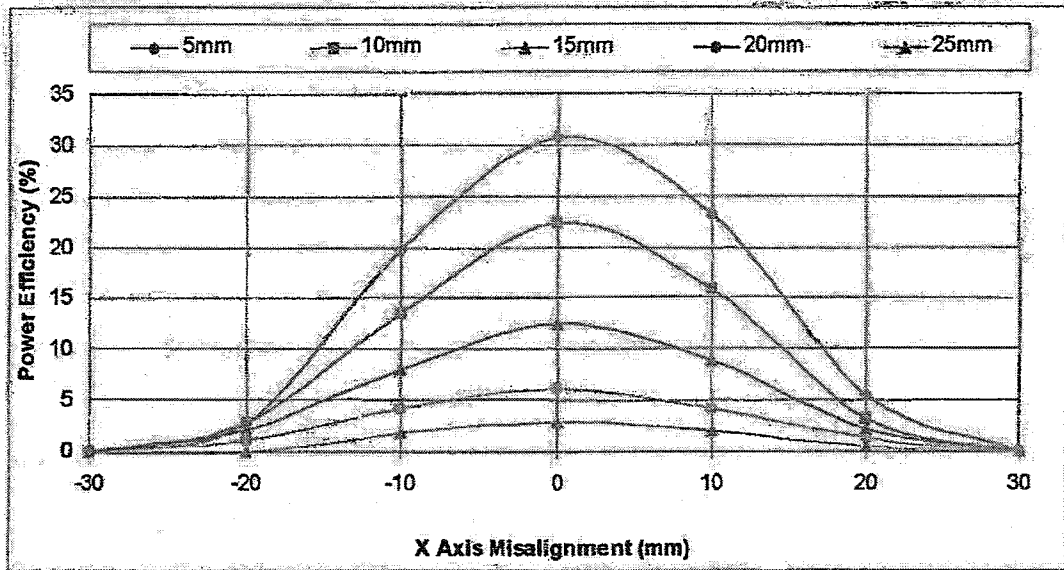
X Axis Misalignment, Secondary Recharging Coil B



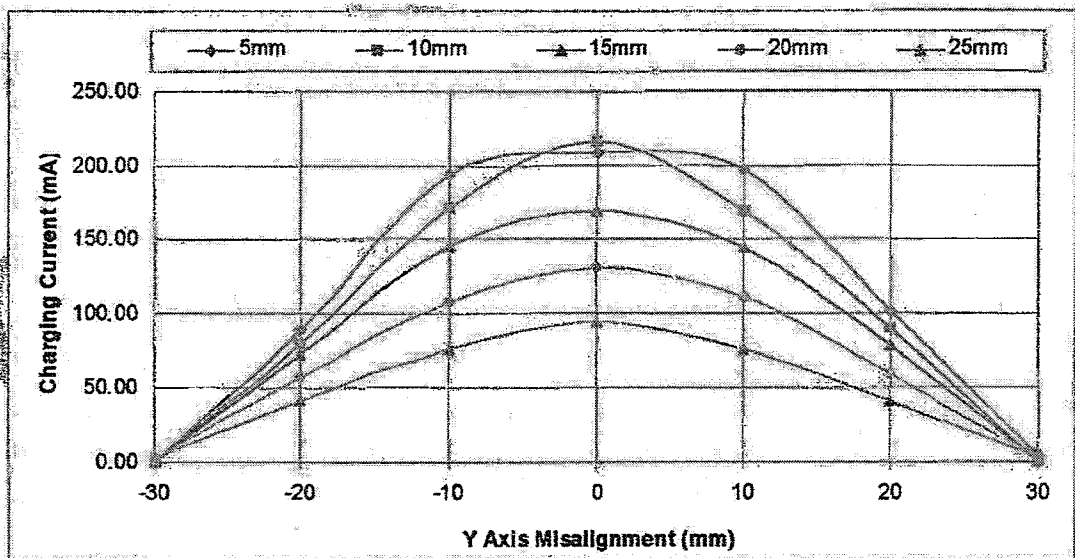
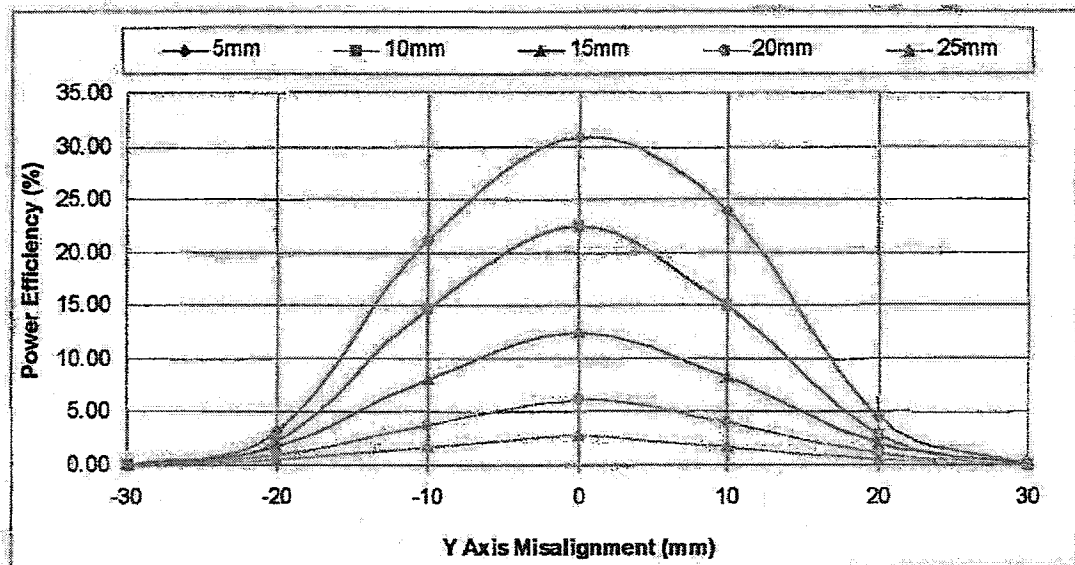
Y Axis Misalignment, Secondary Recharging Coil C



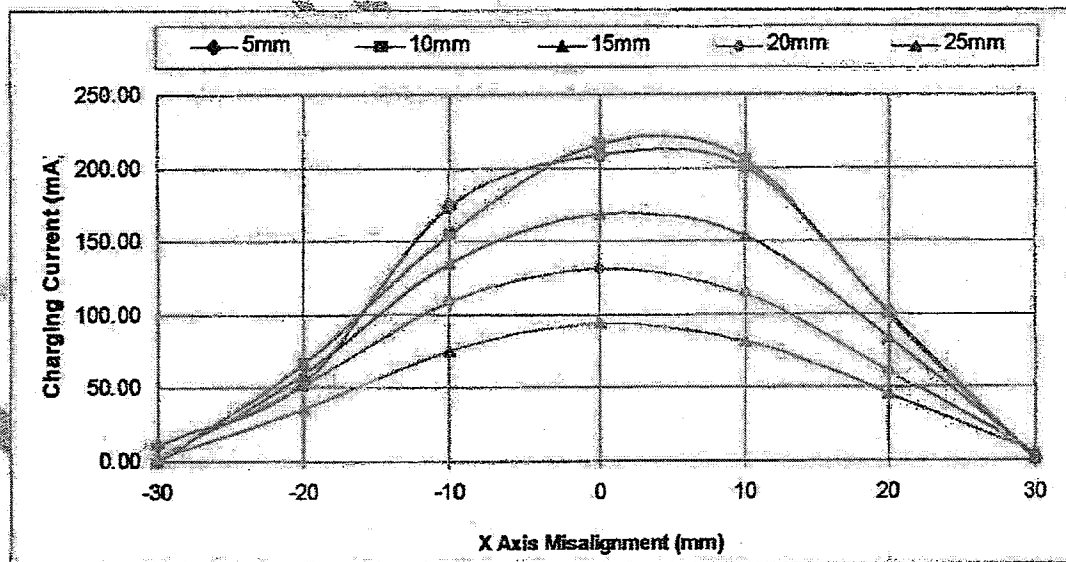
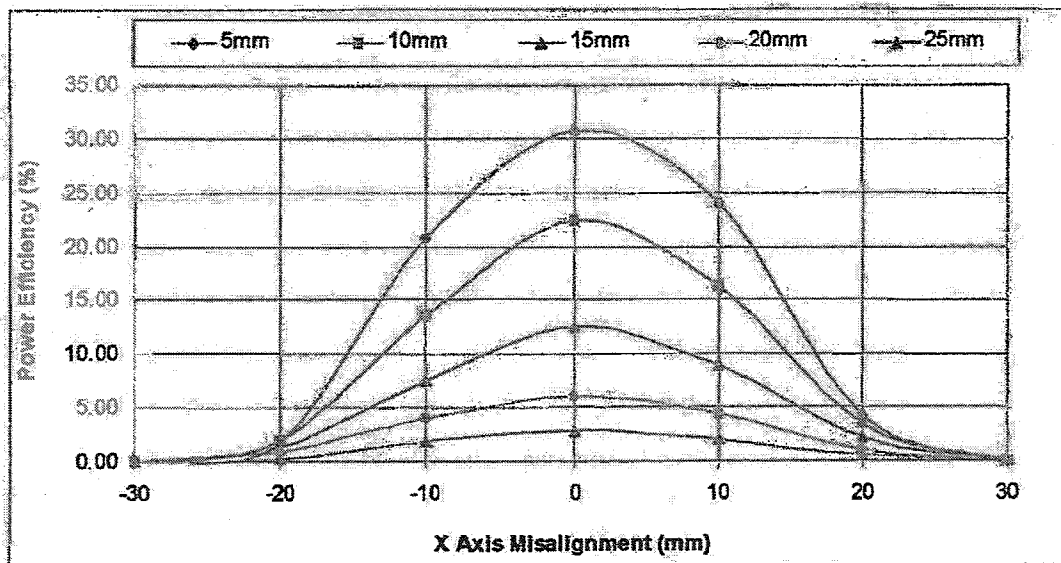
X Axis Misalignment, Secondary Recharging Coil C



Y Axis Misalignment, Secondary Recharging Coil D



X Axis Misalignment, Secondary Recharging Coil D



8. These data graphs from paragraph 7 show that to achieve optimal power efficiency and charging current, the primary recharging coil should be oriented as directly concentrically as possible with respect to the secondary recharging coil.

9. Additionally, the implantable medical device was tested in a cadaver lab. The cadaver was utilized to simulate the implantation of the implantable medical device in a human.

10. During testing, users positioned the external primary recharging coil with respect to the implantable medical device. The users established the location of the implantable medical device by palpating the skin of the cadaver, and positioned the primary recharging coil based on the established location. The outer edges of the implantable medical device were the dominant factors for determining the location of where to place the external primary recharging coil.

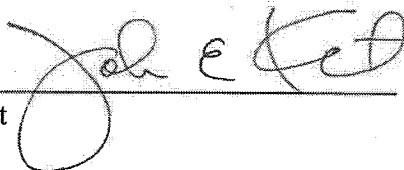
11. When the user positioned the primary recharging coil with respect to the implantable medical device, a locating piercing fixture was used to determine how concentrically the external primary recharging coil was located with respect to the implantable medical device. The locating piercing fixture functioned by piercing the tissue of the cadaver and making a mark on the implantable medical device in the location of the center of the primary recharging coil. The test was conducted multiple times by multiple testers, and resulted in the following marks created by the locating piercing fixture on the implantable medical device:



12. The data from paragraph 11 establishes that the average location of the user placements of the primary recharging coil with respect to the implantable medical device was approximately in the center of the implantable medical device. The data from paragraph 7 establish that the efficiency of the charge transfer could be optimized by positioning the primary recharging coil as concentrically as possible with the secondary recharging coil.

13. Based on the combination of data from paragraphs 7 and 11, it was determined that the optimal location for the secondary recharging coil with respect to the implantable medical device was as close to the center of the implantable medical device as could be practically achieved. By positioning the secondary recharging coil at the location of the average user placement of the primary recharging coil as determined in paragraph 11, the optimization as determined in paragraph 7 would be most likely to be achieved by the average user.

Further affiant saith not.


John E. Kast

Subscribed and sworn to before me
this 10th day of February, 2009.


Notary Public

